ASD Workshop 2023

24 JAN 2023

Vacuum System

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On Behalf of Vacuum Group

ESRF | The European Synchrotron

OUTLINE

Dashboard

- Reliability
- Performances

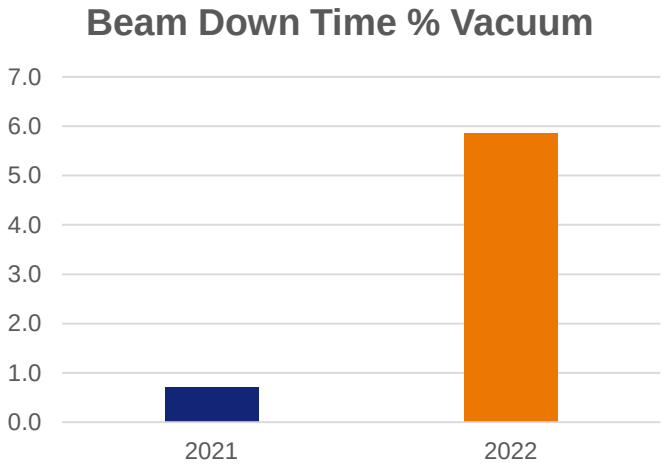
Activities

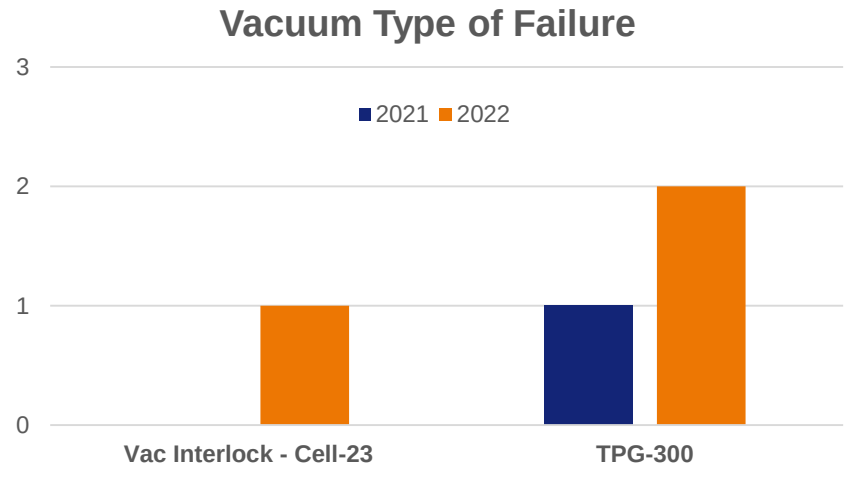
- Interventions
- Desorption Line

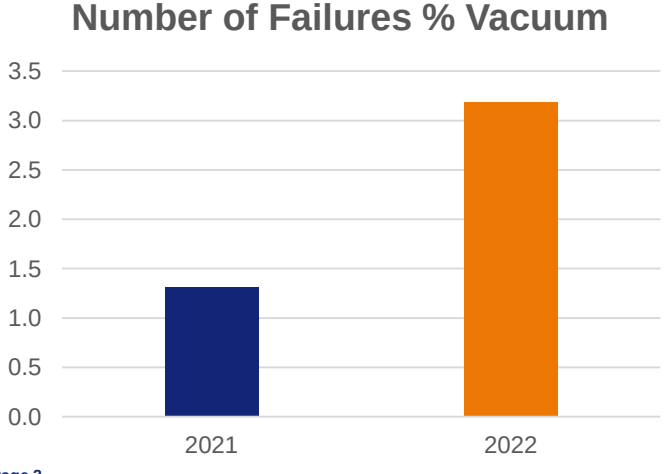
Kickers

- Current design - Additional coating
- New Kicker Design

DASHBOARD - RELIABILITY

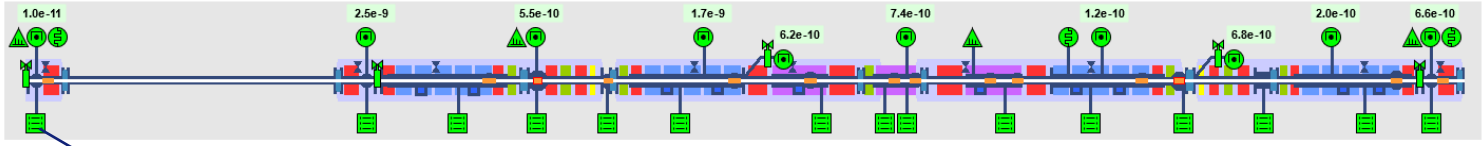


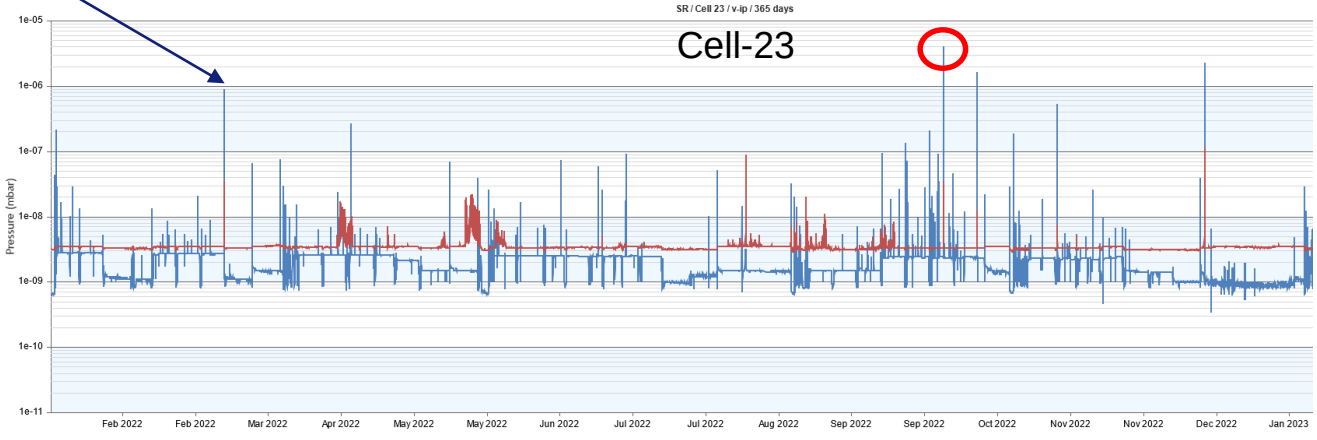


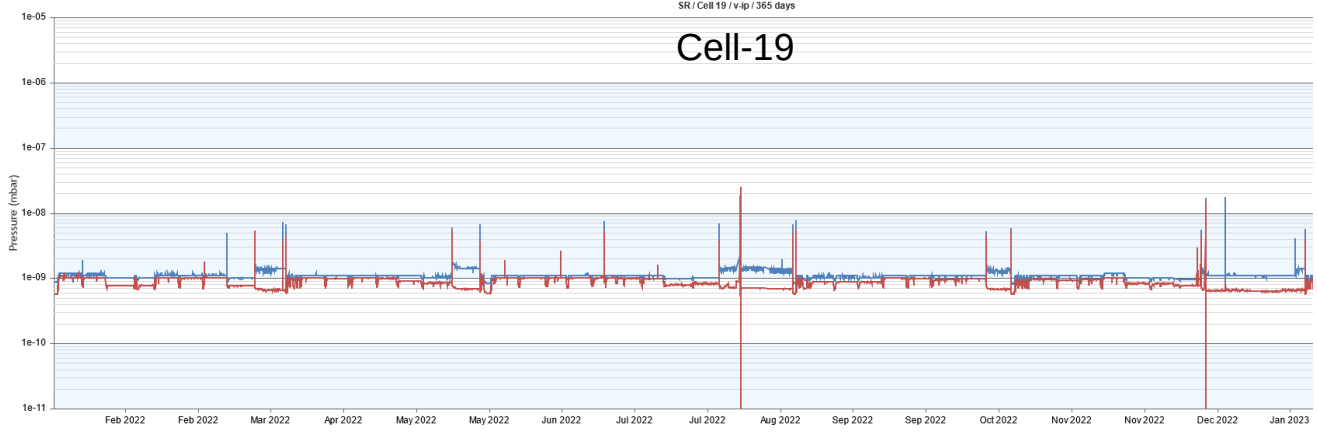


- Both number of failures and beam down time due to vacuum increased in 2022
- But still few cases, mostly due to gauge controller TPG-300 (will be replaced by new model progressively)

DASHBOARD – RELIABILITY - PRESSURE INTERLOCK CELL-23



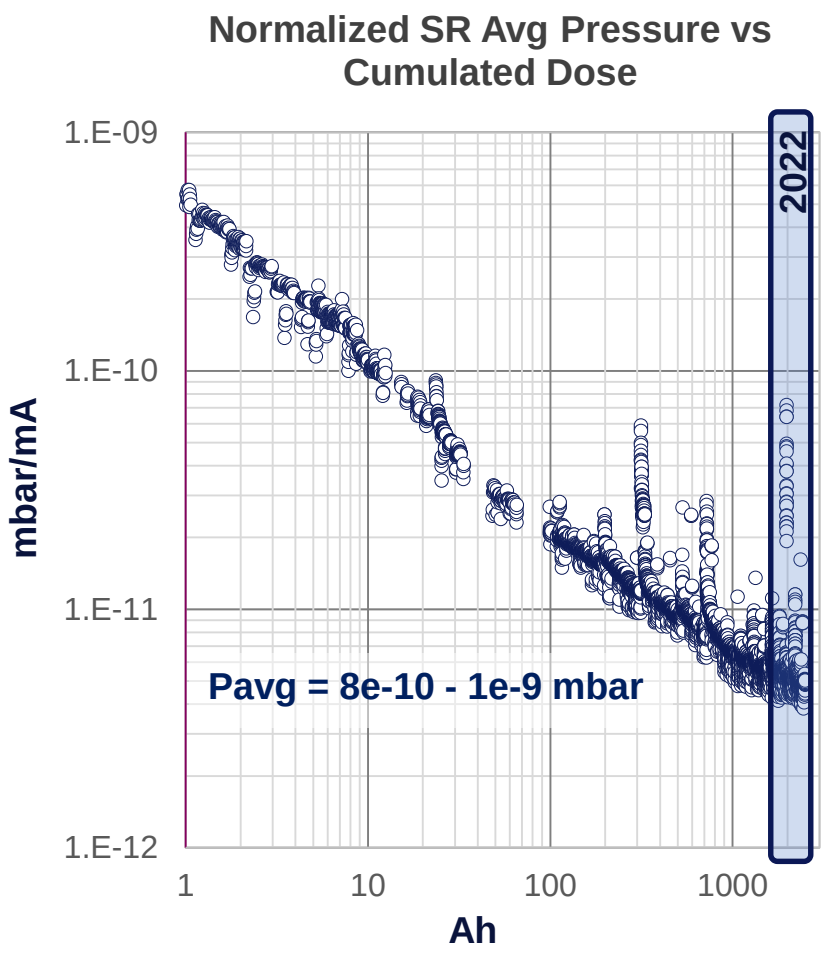


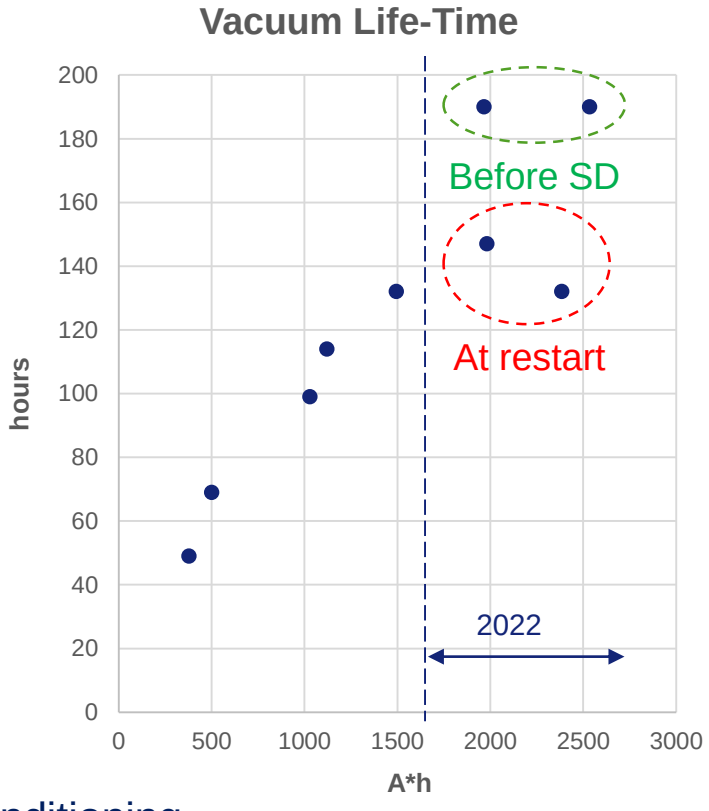


- Straight section 23 will be inspected in one of the 2023 Shut Down

- Cell-19 is one of the most quiet cells

DASHBOARD - PERFORMANCES





- Still conditioning
- Reaching lowest measurable limit in some locations
- No real effect on vacuum life-time

OUTLINE

Dashboard

- Reliability
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Activities

- **Interventions**
- **Desorption Line**

Kickers

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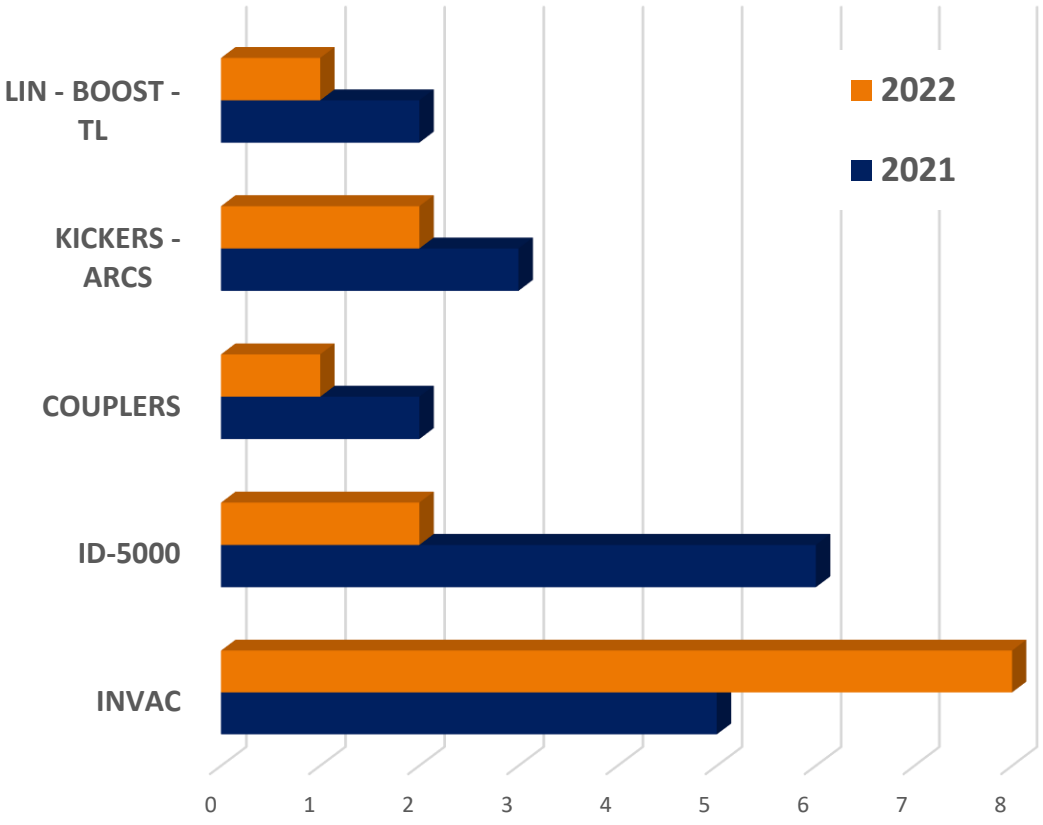
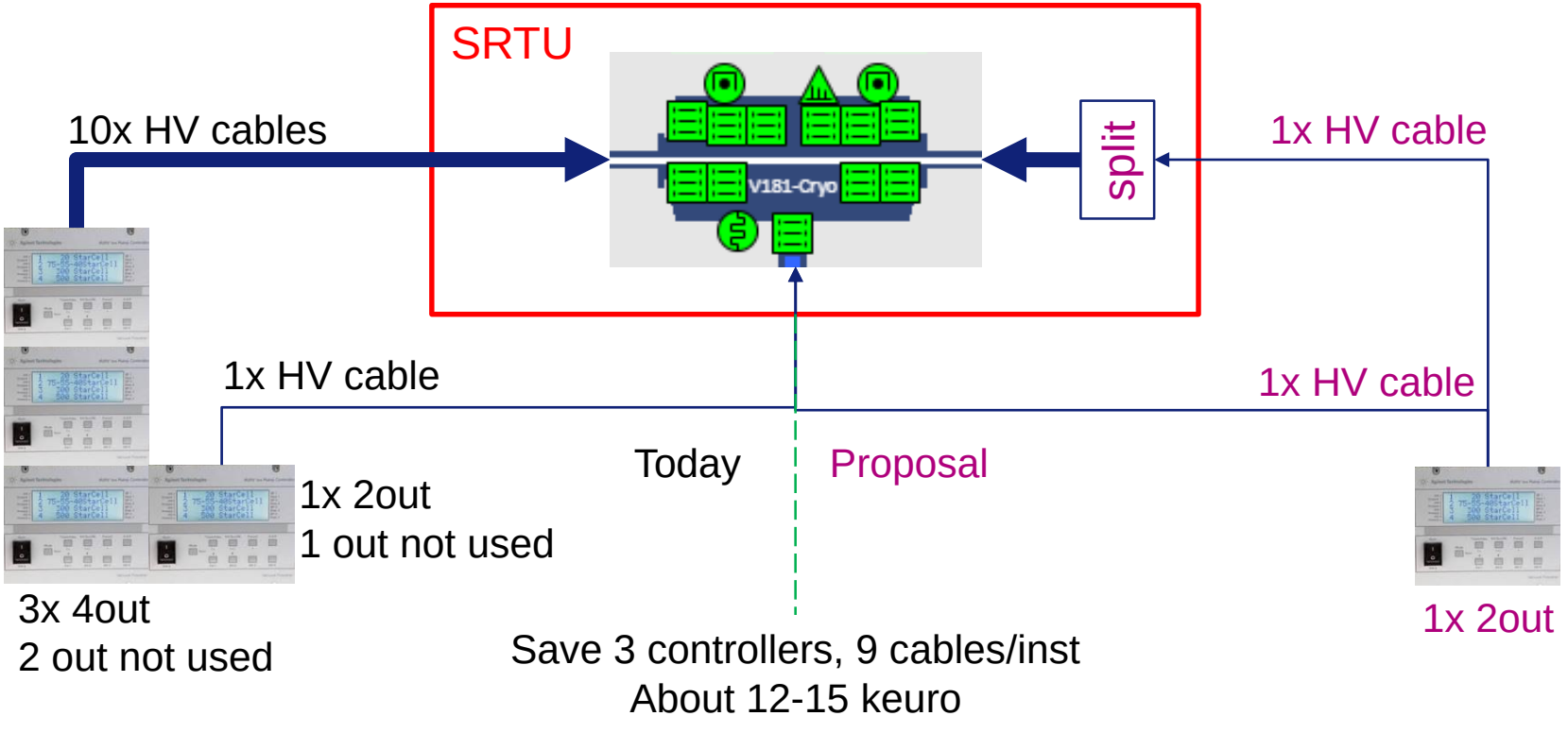
ACTIVITIES - INTERVENTIONS



- Interventions are more and more concentrated on straight section with INVAC
- Time-demanding (warm-up, cool-down, alignment, baking etc…)
- Short shut-down not useful for this activity
- 4x SD / year with OCT and MAY longer, would help a lot:
  - allows repairs,
  - avoid double intervention for preparation
- Next two years (23-24) 2 + 2 New INVAC
  - About 50 “side” chambers/components needed -> 100 keuro/year
  - Planned with ASD budget – Start Procurement

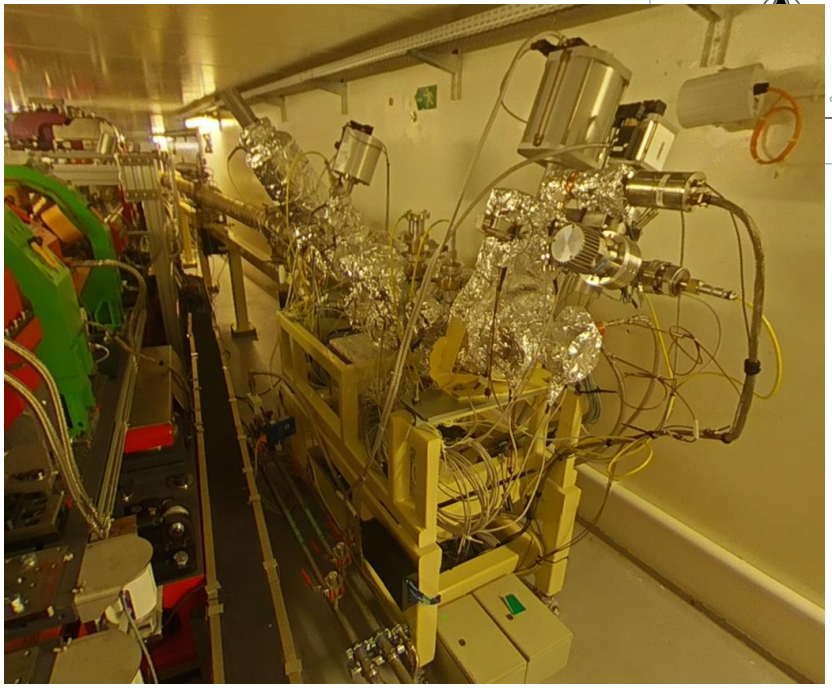
Vacuum Instrumentation Rationalization

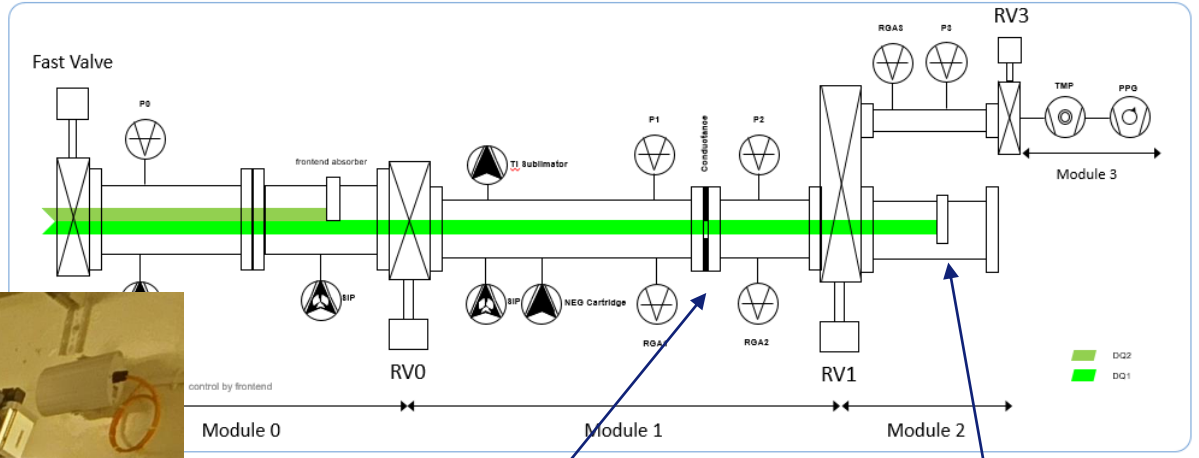


Will be tested on next INVAC assembly at ESRF01

ACTIVITIES – DESORPTION LINE

To Measure the PSD yield of different materials





Aperture 58x8 by 2mm

Sample under test

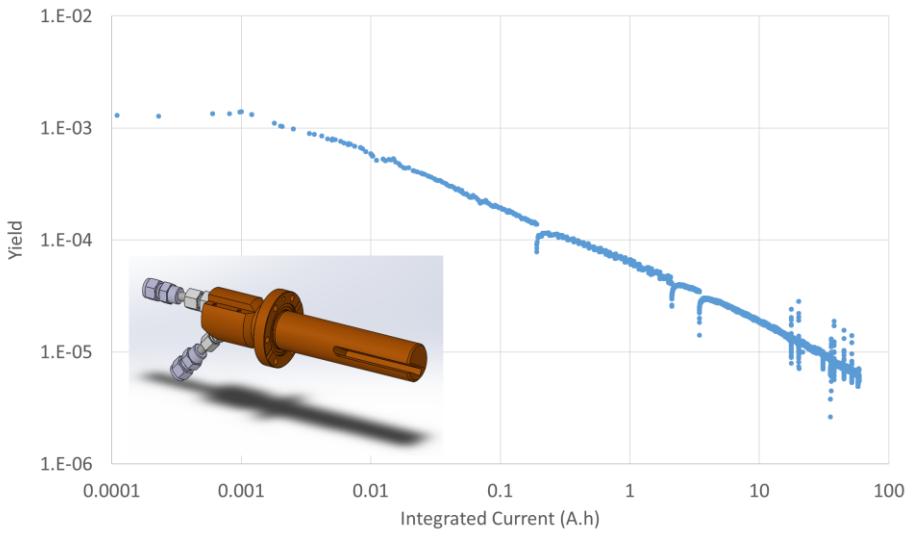
Most of the equipment used in the old machine installation have been recovered

The photon desorption measurement setup is now installed and in use at D15

ACTIVITIES – DESORPTION LINE

FIRST RESULTS

- Measurements of CuCrZr alloy absorbers
- In agreement / Validated the conditioning data observed from EBS storage ring



FOR THE FUTURE

- Additional vacuum chamber support will be installed
- Goal is to measure photodesorption from vacuum chambers up to 2.3 meters long with photons from both available sources.

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Kickers

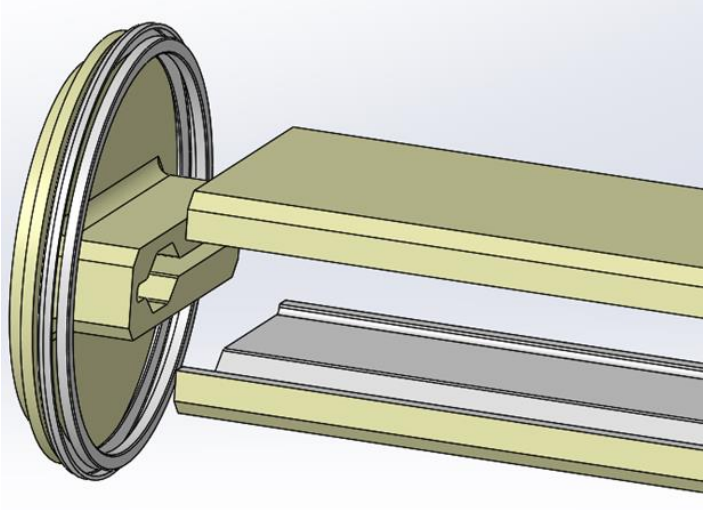
- **Current design - Additional coating**
- **New Kicker Design**

KICKERS – FROM LAST YEAR

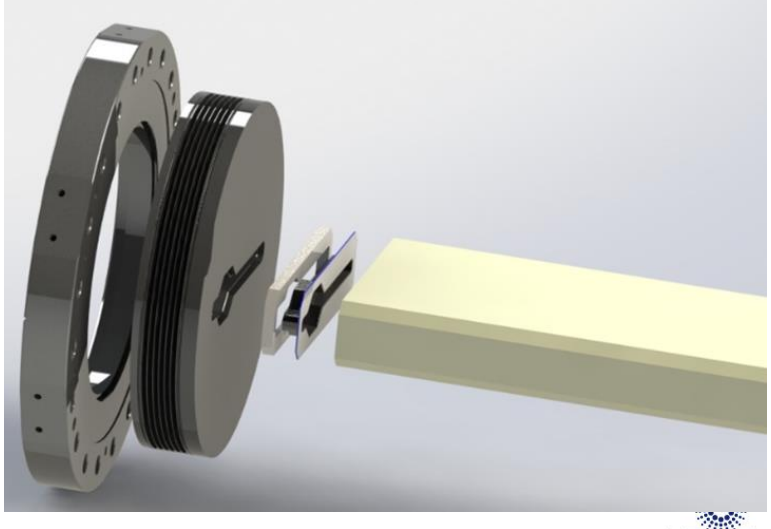
16-bunch current limited to 32mA due to thermal stress -> cracks

Two main activities/solutions

Existing Kickers – Original Design
Additional Coating -> reduce power / stress
Additional Spare



New Kicker Design – One Single Piece
Eliminate ceramic junction
All 4 same geometry



KICKERS – ORIGINAL DESIGN – ADDITIONAL COATING

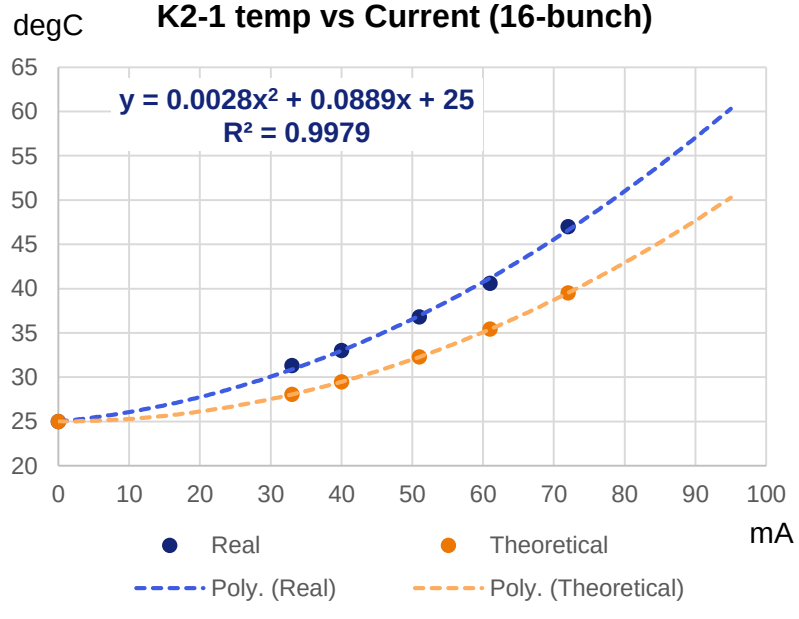
Average total Resistance reduced from 20 to 2 ohms (/10)
Allows x3 in current (x10 power) -> 32 to 96 mA
With same power -> max temperatures (<50deg)

Installed on:

- K1 and K2 - 2021/22 winter SD
- K3 – K4 - in 2022 March SD
- 75mA validated with T<50deg

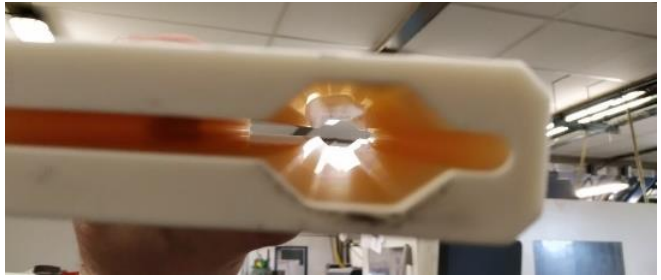
- Temperatures higher then expected
- Maybe due to “real Tamb” seen by ceramic that increases with current (linear term in the fit)?
- Without this linear effect (Theoretical) Tmax @ 96mA <50deg

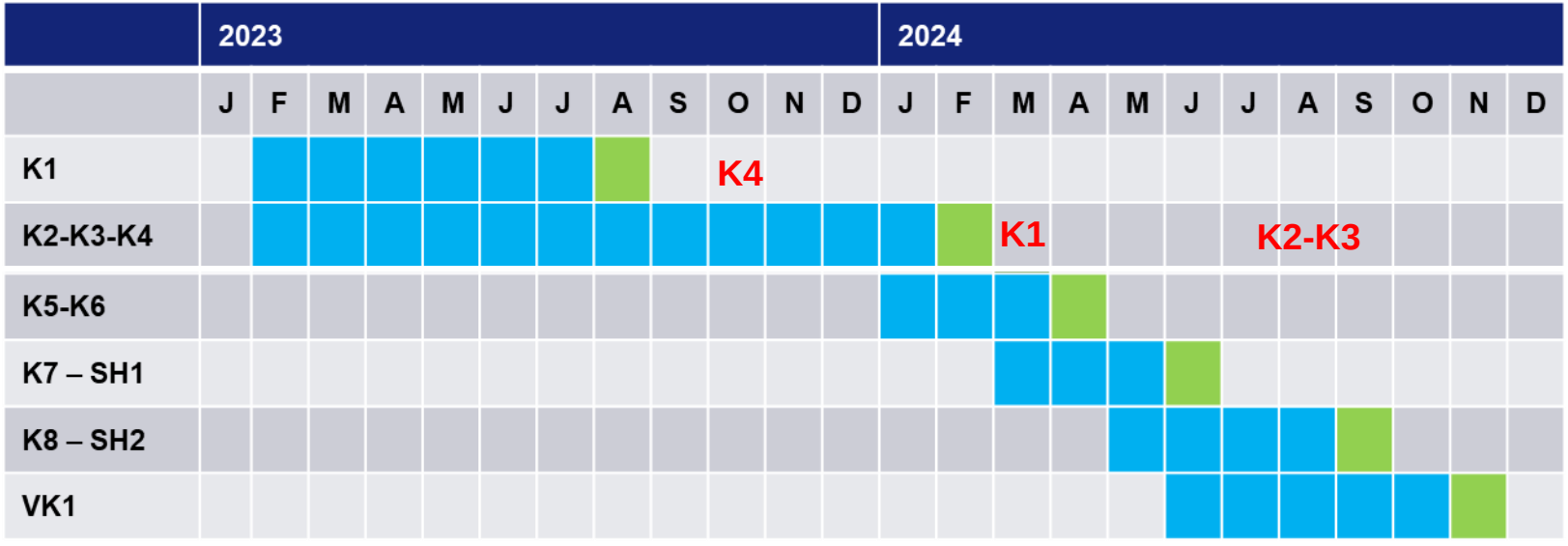
- Additional spare chamber from FRIATEC expected by April-23 -> possible test at full current in May-23



KICKERS – NEW DESIGN – CERAMIC BODY SINGLE PIECE

- Design frozen since 2020 (quite fast)
- Long survey and many test with 5 different suppliers
- Only one succeeded in making in one single piece: SOLCERA
- Tender assigned and contract started in Nov-2022





CONCLUSIONS

- Performances and Reliability confirmed at very good level also in 2022

- Number of interventions in line with previous year
- More and more concentrated on straight section with INVAC (often cryo)

- D15 photodesorption line is operative – To be extended in 2023

- Kickers program longer than expected – suppliers hard to find or very busy not responsive
- Additional spare, with original design should allow test at full current in 16-bunch in May-23
- New design deliveries completed in 2024

THANK YOU !